

Growth Response of *Heterotis Niloticus* (Cuvier 1829) Fingerlings to Artificial Feed and Chicken Manure

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Abstract— The study aimed at determining the growth response and survival rate of *Heterotis niloticus* on artificial diet and chicken manure reared in earthen pond system. The experiment was designed as 2 treatment x 12 weeks factorial replicated twice. The fingerlings of *H. niloticus* were collected from the wild, acclimatised and stocked in an earthen ponds of (200m²) at 50 fish/m²/pond and fed with compounded diet of 30% crude protein and chicken manure for twelve weeks. The body weights were determined bi-weekly using electronic weighing balance. Final mean weight of 32.89±9.10g fish fed with chicken manure and 22.19±2.8g were obtained. Fish fed with chicken manure had a better growth rate. The water quality variables were similar except Dissolved oxygen and Turbidity that shows a sharp difference in culture ponds. The results of the present experiment showed that *Heterotis niloticus* fingerlings have a different growth performance, under earthen pond system with fish fed with chicken manure having better performance. Therefore, the culture of *H. niloticus* with chicken manure is recommended for better growth.

Keywords— Growth response, *Heterotis niloticus*, Earthen pond, Culture, Fingerlings.

I. INTRODUCTION

Heterotis niloticus (African bonytongue) is a large fish that is wide spread in many parts of Africa Moreau (1982). This species is native to many parts of Africa and has also been introduced into many African rivers and lakes to increase fish production Micha(1973), the fresh water of forested region of Nigeria supports large population of the West Africa Osteoglossid fishes. *H. niloticus* is an important element in artisanal fisheries of Nigeria. Mgbewe 1982, Magbenka and Eyo (1992). The hardness of this fish together with its high growth rate make it candidate for aquaculture in Africa, but due to general environmental degradation including oil spillages pollution and destruction of mangrove swamps this species has lost an estimated 60% of its previous breeding and nursery habitat in Nigeria Bake and Sadiku(2005) described a decline in the population density of *Heterotis niloticus* from Ogun reservoir, Nigeria over a two year

period. January 2002 to December 2003. And they recorded decline of the species from similar reservoir in Nigeria indicate that the species is threatened in this environment Olaniyan and Zwilling (1963), Akegbejo *et al* (2003), Faturoti and Obasa (2005). The introduction has been reported by many authors. Iitis 1961, Nvogo 1962, Vincke (1971), Akegbejo- Samson *et al*(2003). Nguenga and Brumeth (2003).

Yao *et al* (2003). Though *H. niloticus* has considerable aquaculture potential for growth and maintenance, if nothing is done in the area of rearing of the species it might go into extinction in the nearest future. There is a paucity of information on the influence of compounded diet on growth and survival of *H. niloticus* unlike other culturable fish species, hence it may be necessary that any research on the use of artificial feed be complemented by assessing its growth response.

This is more true when catfish and tilapia production are becoming monotonous in Nigeria aquaculture. It is in line with these that this work is designed to assess the growth response of *H. niloticus* in earthen ponds.

II. MATERIALS AND METHODS

STUDY AREA

The study was carried out at NIOMR Sapele Station Farm site. Deghele, Sapele Local Government Area of Delta State, Nigeria.

Compounded diets of 30% crude protein (T¹) and chicken manure (T²) were used for the feeding of *Heterotis niloticus* fingerlings. Four (4) 200m² earthen ponds were used for the culture of *H. niloticus* for a period of three (3) months. The ponds were drained completely, limed and then allowed to stay for two (2) weeks till the effect of the lime is completely neutralized. The ponds were then refilled with fresh water from the bore hole.

One thousand (1000) fingerlings of *H. niloticus* of average weight of 2.08gm obtained from wild were acclimatised to the new environment for a week before stocking into the experimental ponds.

The treatments were applied in the experimental earthen pond. This includes T¹ compounded diet 30% C.P. and Dry

chicken manure at the rate of 500gm to fertilizer the pond daily. Each treatment were replicated twice.

Weighing of the fish and record of feed consumed were taken bi-weekly. 50 live fish were randomly sampled from each pond. Total length, standard length, and weigh were taken bi-weekly and recorded for the period of twelve (12) weeks.

Nutrient Utilization Parameters

Nutrient utilization parameters were determined based on the following formulae:

$$\text{Feed conversion efficiency (FCE)} = \frac{\text{Final weight by fish} \times 100}{\text{Weight of feed given}}$$

$$\text{Specific growth rate (SGR \% day)} = \frac{100 \times [\ln(\text{Final body weight}) - \ln(\text{Initial body weight})]}{\text{Rearing period in days}}$$

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$$\text{Survival rate (SR\%)} = \frac{\text{Total fish number harvested} \times 100}{\text{Total fish number stocked}}$$

$$\text{Performance Index (PI)} = \frac{\text{SR} \times \text{FMW(g)} \times \text{IMW(g)}}{\text{Rearing period in days}}$$

SR = Survival Rate, FMW = Final Mean Weight, IMW = Initial Mean Weight.

WATER QUALITY ANALYSIS

Samples of water from each treatment were taken bi-weekly to determine the values of pH, dissolved oxygen concentration, Turbidity, temperature in degrees centigrade according to the method of (Boyd 1999). Water temperature in degree centigrade was measured by using a thermometer. The pH value of water was measured using an electric digital pH meter model (Jenway Ltd, Model 350-pH meter). Dissolved oxygen was determined bi-weekly using an Oxygen meter and turbidity measured with sechidisk.

STATISTICAL ANALYSIS

Data collected were subjected to analysis of variance (ANOVA) using SPSS software (version) 16.0. Mean separation was done using Duncan's Multiple Range Test. All test were carried out at 5% probability level.

III. RESULTS

Growth performance of *H. Niloticus* fed 30% CP compounded diet and dry chicken manure.

Data on fish growth performance for compounded diet and chicken manure on the experimental ponds is presented in table.3

Growth performance of *Heterotis niloticus* were significantly affected by protein management (Table 3). Fish in all treatments gradually grew with time and the highest final mean weight was obtained in Treatment T2. The optimum final mean weight gain, specific growth rate, performance index of *Heterotis niloticus* were obtained in T2. Whereas the least growth performance was obtained in treatment T1 ($P < 0.05$). Survival rate among the different treatments was better in treatment T2 (Table 3). Feed conversion efficiency (FCE) was best in T2 whereas the poorest feed conversion efficiency was recorded in T1. As fish in all treatments grew, feed consumed and FCE increased by time and the highest T1 (Table 3).

Ingredient and proximate chemical analysis (%) on dry matter basis of the experimental diets.

Ingredients	%
Fish make meal (65%)	10
Soya bean meal 44%	30
Corn	10.6
Wheat brain	10.0
Groundnut cake	22.0
Palm kernel cake	10.0
Bone meal	2.0
Vegetable oil	5.0
Vitamin & minimal premix	0.25
Metheonine	0.1
Lysine	0.1

Proximate Analysis of the Experimental Diets

Parameters	Compounded Diet (T1)	Chicken Manure (T2)
Crude protein	33.00	27.90
Crude fat	-	-
Crude fibre	5.41	10.7
Ash	9.10	13.6
Moisture	13.00	3.46
Phosphorus	-	-
NFE	35.24	25.60
Ether Extract (EE)	4.25	0.7
Organic matter	-	64.80
Calcium	-	10.9

Table.3: Growth performance of *H.niloticus* on different diet

Growth performance	T1	T2
Initial mean weight (g)	2.08±0.00	2.08±0.00
Final mean weight (g)	22.19±2.8	32.89±9.10
No of fingerlings stocked	1000	1000
% Mortality	52.0	25.0
Survival rate (SR %)	48	75
Specific growth rate (SGR)	4.95	5.23
Feed conversion Efficiency (FCE) (%)	141.94	50.22
Performance Index (PI)	26.37	61.08

Table.4: Water quality Analysis:

Parameters	Treatments	
	T1	T2
Temperature 0 ⁰ c	30.49	30.65
Dissolved oxygen mg/l	7.78	8.76
pH	6.35	6.60
Transparency (cm)	45.98	26.60

Table 4 shows the results of the water quality analysis. The results shows that the highest pH of 6.60 was recorded for treatment T2 while least pH of 6.35 was recorded in treatment T1. The highest mean dissolved oxygen 8.76mg/l was recorded for treatment T2 and the lowest dissolved oxygen 7.78mg/l was recorded for treatment T1.

The highest temperature 30.65⁰c was recorded in treatment T2 while the least temperature of 30.49⁰c was recorded for treatment T1. The highest (transparency) 45.98cm was recorded in treatment T1 while the least 26.60cm was recorded for treatment T2. However there were no significant difference in all the water quality parameters except the water transparency where T2 was more transparent than treatment T1.

IV. DISCUSSION

The result of the study shows that growth rates were more favourable in fish fed with chicken manure as compare with fish fed with dried compounded diet. The final weight gain indicate that treatment T2 pond fed with chicken manure did better than treatment T1 pond fed with compounded diet. This could be attributed to the feed and feeding habit of *Heterotis niloticus* which is predominantly plankton feeder. The inclusion of chicken

manure (organic fertilizer aid the production of plankton. Hence, increase in growth rate of *Heterotis niloticus* in treatment T2. Bake G. G. And Sadiku, S. O. E. 2005; Edoghotu A. J. and I. A. Hart, 2014 observed that the stomach content of *Heterotis niloticus* from river Kaduna flood plain is most predominantly contain plankton (Phytoplankton and Zooplankton). The highest growth rate observed in treatment T2 with dried chicken manure could also be attributed to production of plankton which is preferred food organism for *H. Niloticus*. (Poajah, Edioghotu A. J. and I. A. Hart 2014).

WATER QUALITY PARAMETERS

The water quality parameters values (Table 4) were within the acceptable limits for warm water fish as stated by (Boyd 2003). The physiochemical parameters monitored in the pond as indicated in table 4 showed that water pH, DO, Temperature and Transparency varied among the treatments and this is in accordance to Boyd (1999). pH should be 6.0 -9.5. DO should be above 3mg/l, temperature 28 ± 1.0⁰c, however, there were no significant different in pH, temperature was observed among the treatment T1 and T2. Whereas there was significant difference in transparency in T1 and T2. Treatment T2 was more turbid than treatment T1. This could be attributed to the introduction of chicken manure in treatment T2 which bring about the plankton bloom which reduced the visibility of the secci disc. Though, the values are within the acceptable limit. According to (Boyd 1999).

V. CONCLUSION

The result of the experiment shows an excellent growth performance and status of *Heterotis niloticus* on chicken manure. These recommends the suitability of chicken manure for *H. Niloticus* fingerlings.

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